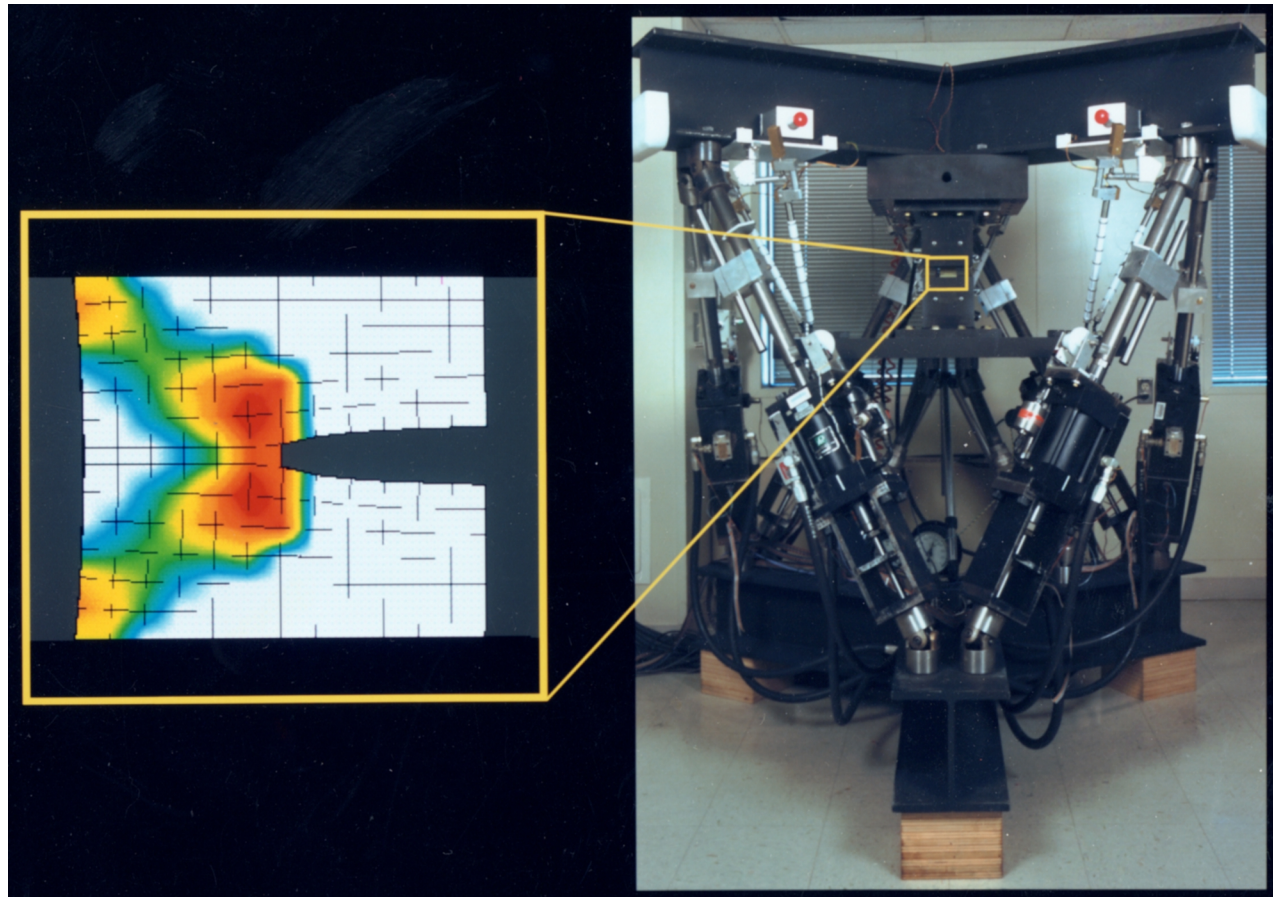


# COMPOSITE CHARACTERIZATION



Six-degrees-of-freedom robotic testing machine used for the automated characterization of composite materials. The blowup region shows the distribution of the dissipated energy density on the used specimen for a specific load increment.

The Composite Characterization program at the Naval Research Laboratory (NRL) is concerned with the prediction of the linear and nonlinear behavior of composite materials. NRL has developed an automated procedure that uses multidegree-of-freedom robotic testing machines in conjunction with advanced computational techniques and analytical methodologies to identify completely the constitutive behavior of composites. This behavior is encapsulated in the form of the dissipated energy density function, which depends only on the strain fields and is unique for each material system. The dissipated energy density function for each identified material is stored in a material properties database and then used in the structural and material simulating technology that NRL has developed. Knowing the behavior of composites is essential in structural design, material tailoring, material processing and design, material certification, and multiobjective optimization of resources during the development of a structural system.

## *Point of Contact*

Naval Research Laboratory  
4555 Overlook Avenue, SW • Washington, DC 20375-5320

P. R. FACTORY • Materials Science and Technology Division • (202) 767-2165  
e-mail • [factory@ramp1.nrl.navy.mil](mailto:factory@ramp1.nrl.navy.mil)